# Perspectives on the Bell System: Strategy, Structure, Technology, and Unionism

RICHARD H. K. VIETOR

***The Telephone Enterprise: The Evolution of the Bell System's Horizontal Structure, 1876–1909.*** **By Robert W. Garnet. (Baltimore: John Hopkins University Press, 1985. xxiii + 210 pp. $22.50.)**

***The Anatomy of a Business Strategy: Bell, Western Electric, and the Origins of the American Telephone Industry.*** **By George David Smith. (Baltimore: Johns Hopkins University Press, 1985. xxii + 237 pp. $20.00.)**

***From Invention to Innovation: Long-Distance Transmission at the Turn of the Century.*** **By Neil H. Wasserman. (Baltimore: Johns Hopkins University Press, 1985. xxiii + 160 pp. $17.50.)**

***The Making of Telephone Unionism, 1920–1947.*** **By John N. Schacht. (New Brunswick, N.J.: Rutgers University Press, 1985. x + 282 pp. $30.00.)**

Divestiture of the Bell System in 1984 dramatically reversed more than a century of integration, standardization, and centralization. These factors together produced the world's largest corporation (in both assets and work force) which, guided by regulation, managed the world's largest and most effective telecommunications network. Although technology and economics drove these developments, none were inevitable or easily accomplished.

All four of the histories reviewed in this essay attest to the gradual, plodding, and often disorderly administrative efforts that produced the Bell System, the telephone network, and the Communications Workers of America (CWA). Yet, the degree of overlap among these four books is surprisingly small: in part because each study is narrowly conceived, and in part because the story itself has epic proportions. Two of the books examine top management's approach to horizontal and vertical integration. The third focuses on the process of technical innovation and its implementation by middle management. The fourth book starts from the bottom up, tracing the evolution of a centralized labor organization. While each book adds a piece to the larger history

RICHARD H. K. VIETOR is professor of business administration at the Harvard Business School.

*Business History Review* 60 (Winter 1986). © 1986 by The President and Fellows of Harvard College.

of telecommunications, all four are stand-alone studies, contributing to the fields of business history, technology history, and labor history.

These books share a common departure from the conventional literature, including the "Robber Baron" tradition of attacking AT&T's monopoly power (N. Danielson, H. Coon, and J. Goulden); specialized analyses of financial, economic, and social factors (J. Stehman, G. Brock, J. Brooks, and I. Pool); biographies of the industry's leaders, especially Alexander Bell and Theodore Vail (R. Bruce, C. MacKenzie, and A. Paine); and previous studies of labor relations (J. Barbash and T. Brooks) and technology (G. Prescott and M. Fagan). Either consciously or not, these authors utilize the organizational synthesis developed by Alfred D. Chandler, Jr., in *Strategy and Structure* (1962) and *The Visible Hand* (1977). For company and union alike, strategic goals and organizational structure responded to available markets and technology.

Three of the books—by Garnet, Smith, and Wasserman—are the first fruits of the Johns Hopkins–AT&T Series in Telephone History, edited by Louis Galambos. This joint endeavor, supported by AT&T's archival program, is further evidence of the business community's resurgent interest in analytical administrative history. Instead of attempting definitive business biographies, this open-ended series gives individual scholars the opportunity to examine specific themes. These first three products are appropriately short, with high-quality illustrations, appendixes, indexes, and notes. More important, all three are carefully researched in AT&T's rich archival material.

Robert Garnet's study of the Bell System's horizontal integration originated as background material for the defense in *U.S. v. AT&T.* Without being ahistorical, Garnet has provided a fascinating analysis of the origins of the horizontal structure that the Justice Department alleged to be anticompetitive. Garnet documents American Bell's humble start in 1877 (the year after Bell's great invention) as a patent association, relying for its revenues on agent licensees and equipment leasing. For its capital-short owners, this system was the easiest, and perhaps only, way to get started and grow fast, while keeping absolute control over valuable patented instruments. This was the essential strategy.

Almost from the start, however, integration seemed unavoidable, as rapid growth and intense competition with Western Union forced Bell to extend financial support to agents in their scramble to establish exchanges. At the same time, Theodore Vail, the company's first professional manager, introduced administrative organization. In 1879, the fledgling Bell Company and the giant Western Union Company agreed

not to compete, leaving voice communications (local) to Bell and telegraph (long-distance) to Western Union. This settlement, of course, was an extraordinary blunder by Western Union—the price of ignoring potential markets and focusing exclusively on existing markets.

Although this agreement eliminated competitive pressures temporarily, the impulse toward integration continued, coming from technological developments in exchanges (switching centers) and in toll (long-distance) services. AT&T, organized in 1885 as the long-distance subsidiary of American Bell, became increasingly involved in the financial and technical weaknesses of licensees. Yet throughout the 1880s, financial weakness, political opposition to excessive power, and management caution prevented any serious progress toward integration and central control.

After 1894, when Bell's patent monopoly expired, competition and chaotic growth once again forced the process of structural integration. To coordinate production and distribution of telephones, exchange equipment, and cable, and especially the movement of millions of calls, Bell managers struggled to develop internal controls over accounting, financial planning, personnel, and technical standards. Grudgingly, the tradition of local autonomy gave way to centralized management, and on the last day of the nineteenth century, the company was reorganized as American Telephone and Telegraph, a New York corporation with assets of $107 million and substantial or controlling financial interests in more than thirty regional Bell operating companies.

Several more years of intense competition, burgeoning financial obligations, and widespread political criticism culminated in a management crisis in 1907, and the return of Theodore Vail as CEO. (Vail had left AT&T in 1887 for the investment banking interests of Morgan and Baker.) Vail introduced a functional organization and a new strategy of "one system, one management, universal service." To settle antitrust allegations and end competition, AT&T agreed in 1913 to divest Western Union, to stop buying up competition, and to interconnect with the remaining independent companies. With 82 percent of market share, and virtually all long distance, the Bell System had achieved a monopoly status that would endure for seventy years.

Garnet's story of the management process that led to the horizontal integration of the Bell System is a well-researched, well-written monograph. And it delivers a fair part of what the author promises—a detailed illustration of Chandler's synthesis. But it does not deliver the analysis of political factors that the author advertises in his introduction. When the author declares, in the last substantive chapter, that

the company was "hounded by the specter of regulation and municipal ownership" (p. 128), the reader expects a substantial analysis of AT&T's competitors, AT&T's competitive tactics, and, most significantly, the regulatory movements and antitrust attacks that developed during the Progressive Era. But these forces are merely asserted, not documented or described. Then, when the author notes in the conclusion the importance of looking beyond technology and economics because AT&T was a politically salient industry unlike those studied by Chandler (p. 156), the reader probably agrees, but closes the book less satisfied than he might otherwise have been.

George Smith, in his study of vertical integration, promises less and delivers proportionately more. By vertical integration, Smith means American Bell's upstream investment in manufacturing by purchasing Western Electric and subsequently coordinating manufacturing with communications operations. This early decision, like those to lease telephones and integrate horizontally, formed the basis of a business strategy that would last for decades.

The way Smith frames the issue—as a single, key decision in 1882 that is gradually arrived at and subsequently implemented—reflects a perspective that is unfamiliar to historians; that is, neither organizational nor industrial structure are products of conspiracy, nor, for that matter, natural evolution. Businesspeople, Smith notes, are indeed averse to price competition, preferring consolidation or even cooperation. And, as Smith also shows, technological and market imperatives drove American Bell toward vertical integration (just like Garnet's horizontal integration). But the event, set in complex circumstances that Smith takes pains to describe, was an administrative decision—a strategic choice—by management.

At the heart of this book are two chapters that detail the procurement problems leading up to the acquisition and the development of the acquisition strategy itself. Smith develops the problem carefully, in Chandlerian terms. During its first two years, Bell was plagued by problems of inadequate capacity resulting from an exclusive procurement contract with a family friend. In 1879, it expanded its purchasing to four other manufacturers, taking care to protect its patents. Although bottlenecks eased, new problems developed with quality, differential prices, regional purchasing imbalances, and, finally, competition to serve independent licensees.

In an effort to consolidate sourcing, to achieve economies of scale, and to impose standard designs, while still maintaining adequate capacity, Bell finally purchased Western Electric, the nation's largest producer of electronic equipment. Smith makes a strong case that Bell

managers had more in mind than resolving problems with suppliers. According to Smith, the decision reflects a broader concept of the telecommunications business, anticipating the expiration of its patent monopoly (and thus the need to prevent the preeminent manufacturing firm from falling to competitors), and an interconnected network of local exchanges that would require uniform technical standards, greater cash flow (from manufacturing revenues), and market dominance. Smith credits William Forbes, president of American Bell, and Theodore Vail, then general manager, with this strategic vision, in which the importance of organization would supersede the patents.

Neil Wasserman's study of transmission technology offers the narrowest empirical focus among these books, but the broadest original conceptualization. Wasserman is interested in the management process of innovation. He defines this as a progression of steps through invention and then implementation. Invention entails a research project to develop, demonstrate, and patent a technology, conceived on some scientific base to achieve an identified need. After successful invention, implementation is necessary to establish the new idea's commercial value, design the production engineering, test it, and systematize the process (p. 10).

To test his hypothesis, Wasserman carefully chose a well-defined problem and a small, but important, invention. In the 1890s, long-distance transmission of telephonic signals was severely limited (to about thirty miles) by "attenuation," the reduction of signal strength. Since attenuation depended on the signal's frequency, certain frequencies would be absorbed more than others, causing distortion in voice communications. If the Bell System were to grow beyond local exchanges using high-quality long-distance cables, it needed some method of reducing attenuation. In 1899, a Bell engineer named George Campbell invented a solution—the loading coil. This device was a coil of copper wire wrapped around a donut-shaped iron core. When attached to a telephonic transmission line, the loading coil altered the electrical properties of the circuit by increasing induction proportionately more than resistance. This effect alleviated attenuation, making possible long-distance transmission of hundreds of miles.

But as Wasserman's analysis so effectively demonstrates, this sounds a lot easier than it was. The author treats the complex physics of electricity in considerable depth, and, more important, he has organized the intellectual and organizational progression for maximum clarity and insight. The first substantive chapter describes the nineteenth-century evolution in England of the relevant scientific principles, particularly the Heaviside Theory. This story, incidentally, includes a fascinating vi-

gnette, reminiscent of the movie *Amadeus*, in which the brilliant but impoverished Oliver Heaviside clashes with the established but untalented William Preece. The next chapter explores the Bell System's problem, acquisition of scientific experts, and decision to undertake research. This is followed by the actual invention, its testing, conceptual elaboration, and finally (but belatedly), submission for a patent. The last substantive chapter, which is very important, details the difficult process by which the invention was put into commercial production and application. Here the author is at his best, showing the technical and organizational obstacles to implementation.

Wasserman concludes that, although later research on signal amplifiers has attracted more scholarly attention, "it was the earlier experience with loading that demonstrated the need to use advanced scientific theory in analyzing the problems of telephone transmission." Equally important, "the process of implementing loading engendered the creation of the research and development organization" at the Bell System (p. 6). For any reader interested in the Bell System's history, this story provides a valuable perspective on the relationship of technology to industry. For readers more broadly interested in the history of technology, or in the process of innovation, this case study equals any I have read.

If taken at face value, John Schacht's book on telephone unionism represents quite a different intellectual and philosophical approach to history. The author would no doubt bill himself as a labor historian or a social historian, not an institutionalist. He obviously admires anything that smacks of militancy, and indeed, seems critical of union leaders or rank-and-file at times when they seem cooperative with management or simply inactive. The author also distrusts AT&T's management and generally presumes the company's ill-will and exploitation toward its work force (notwithstanding the author's references to progressive benefits, a relatively passive response to unionism, and a strong reputation as a good employer).

Despite these surface effects, Schacht's book actually tells an extremely detailed and well-documented story of institutional evolution that reflects many of the same forces at work as we have seen in the company's history. The author's thesis is that the process of centralization that led to formation of the Communications Workers of America was a process of responding to environmental imperatives—especially the centralized nature of the Bell System and the federal government's enforcement of labor law. This, according to the author, is different from previous explanations of labor centralization offered by other scholars, including John Commons, Lloyd Ulman, Nelson Lichtenstein, and Robert Michels.

Schacht's book generally follows a chronological organization, starting with early efforts by the International Brotherhood of Electrical Workers (IBEW) to organize telephone workers. He describes the company unions that prevailed during the 1920s. Although these local organizations (about 180 of them) seemed responsive to workers' concerns, the author views their benefits and permanent employment cynically, as mere devices to block independent unionism. After 1935, the Wagner Act made independent unions much easier to organize—indeed, almost mandatory. At that time, the Bell System's unions became independent and affiliated in a loose-knit National Federation of Telephone Workers.

The heart of Schacht's story is the struggle between the more militant leaders who advocated centralization ("one company, one union") and the broader support for traditional autonomy. Between 1937 and 1947, the balance of power between these interests within the Federation gradually shifted in response to the centripetal forces of company and government. Management, according to Schacht, adjusted to the Depression by short-changing labor, not shareholders. By laying off thousands of long-time employees, AT&T kindled the first flames of militancy. Then, during the Second World War, government wage and price controls made telephone employment less desirable than industrial work. This, together with the War Labor Board's centralized administration, lent further support to the militant centrists within the Federation. The climax came in 1947, when most of the Federation's unions struck the Bell System, and lost, at the same time voting for a national union (the CWA).

Chapter 2 of this book, in which the author provides a thoughtful and graphic social history of telephone workers and telephone work in the decade prior to the Depression, is especially interesting and well done. Readers will get a real feel for conditions in central exchange offices, for the lifestyle of telephone workers, and for the social pressures between women and men, and between blue collar and white collar and office and outdoor employees.

Schacht's book has a single, important shortcoming: the author has scarcely studied the history of AT&T, allowing his preconceptions of managerial motive and practice to rule. Although his bibliography indicates that he used AT&T's archives, the fruits of that effort have been limited to Appendix C, where Schacht documents the centralized nature of AT&T labor policy. In a broader sense, the author's analysis of management's labor relations would be more accurate, although perhaps no less critical, if he took a lesson from the other authors and gave Chandler a careful reading. In fact, he might discover an intellectual framework rooted in sociology and industrial organization that could

substantially enrich his own perspective on the process of labor organization and growth.

All four of these research works deal with developments in the private sector of telecommunications, primarily before the Second World War. Apart from the antitrust settlement in 1913, the Wagner Act, and the War Labor Board, government's role does not loom large in these histories. But after 1920, regulation by state and federal government became an increasingly important factor shaping industry structure and market characteristics. In 1934, Congress created the Federal Communications Commission to foster "universal service," making public policy of Vail's company strategy. The half-century history of telecommunications regulation, and the shorter progress of deregulation, merit the next round of scholarly historical study that these works have just begun.